Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously presented) An apparatus for simulating the deformation of materials, particularly of soft body tissues, comprising:

a memory configured to store, for at least one object having a three-dimensional shape:

mechanical parameters of the material of the object,

data as to the position of the object recorded at the vertices of at least one selected mesh, and

force data which represent, in intensity and position, stress to be exerted on the object,

and a computer operatively connected to the memory to evaluate new positions of the vertices, as a function of the stress exerted and the mechanical parameters of the material,

wherein the computer comprises:

a first module (12, 14, 16, 18, 20) configured to determine repeatedly, for each mesh, the deviation between the current length of an edge of the mesh and its previous length and/or its length at rest, and to store respective force data relating to a potential energy of deformation for each vertex of the mesh, the respective force data being obtained from said deviation, and

a second module (30, 32, 36) configured to determine repeatedly, for each vertex, new data as to the position of the vertex as a function of the composition of the forces exerted thereon, data relating to at least one previous position of the vertex and mechanical parameters of the material.

2. (Previously presented) An apparatus according to claim 1, wherein for an object in the form of a hollow three-dimensional envelope the grid pattern chosen is triangular, and wherein the computer is configured to determine the composition of forces at

each vertex of a triangle, as a function of the deviation between the current length of each side of the triangle and the length of the side at rest.

3. (Previously presented) An apparatus according to claim 1, wherein for an object of solid three-dimensional shape, the grid pattern chosen is tetrahedral, wherein the computer is configured to estimate the composition of the forces at each vertex of the tetrahedron, as a function of the deviation between the current length of each edge of the tetrahedron and the length of this edge at rest.

4. (Previously presented) An apparatus according to claim 1, wherein the computer is configured to determine differences between the squares of the current length and the preceding length and/or the length at rest of each edge in order to determine said composition of forces.

5. (Previously presented) An apparatus according to claim 1, wherein the memory is configured to store, in association with each mesh, mechanical parameters of the material of the mesh, at least partially defined locally, particularly at the level of the mesh or elements thereof.

6. (Previously presented) An apparatus according to claim 5, wherein the computer is configured to determine said deviation between the current and at rest lengths, in order to estimate a derivative of the potential deformation energy of each mesh with respect to the position of each vertex of the mesh, the potential energy of deformation being expressed as a function of a Green-St Venant tensor and of mechanical coefficients inherent in the material in said mesh, which provides said force data for the vertex of the mesh.

7. (Previously presented) An apparatus according to claim 6, wherein the mechanical parameters comprise the Lamé coefficients of the material in each mesh in question.

8. (Previously presented) An apparatus according to claim 1, further comprising a third module for developing a data structure and configured to delete mesh sides or edges which connect two "virtual" vertices.

9. (Previously presented) An apparatus according to claim 8, wherein the third module for developing the data structure is further configured to verify that the grid pattern satisfies predefined properties of conformity.

10. (Previously presented) An apparatus according to claim 1, wherein the second module configured to determine the new positional data of the vertices as a function of the composition of forces at each vertex, is configured to determine said new positional data as a function of time, which makes it possible to follow the evolution of the respective positions of the vertices over time.

11. (Previously presented) An apparatus according to claim 10, wherein the determination of the new positional data of the vertices uses a model for solving a differential equation applied to each vertex.

12. (Currently amended) An apparatus according to claim 2, ~~one of the preceding claims~~, wherein the computer is capable of repeatedly determining the positional data of the vertices of the grid, in order to determine the evolution of said positions over time.

13. (Currently amended) An apparatus according to claim 12, further comprising a display interface capable of representing the object in a predetermined form and shown with the ~~desired~~ chosen grid pattern, and wherein the display interface is operatively connected to the computer in order to display the shape of the moving object.

14. (Previously presented) An apparatus according to claim 1, further comprising a user interface provided with a handling device for simulating one or more forces exerted globally on the object.